## THE COMPOSITE TEST.

**24. Potassium Bichromate.** The discovery by Mr. J. A. Alen, a Swedish chemist, that potassium bichromate will preserve milk from coagulation and in excellent condition for testing for a long time, offers the most satisfactory solution to this problem yet proposed. This salt, although poisonous, is not so violent a poison as corrosive sublimate, and may be used with comparatively little danger. On account of its bright, orange color it is not likely to be mistaken for any other substance used in the dairy, and the tint which it imparts to milk, without the addition of any other coloring matter, is so marked that there is no danger of milk that has been treated with it being used for domestic purposes.

**25. The Potassium Bichromate Thoroughly Tested.** The use of potassium bichromate for the preservation of composite samples of milk has been thoroughly tested, with most satisfactory results, by students of the Wisconsin Dairy School during the winter of 1893. Under the direction of Dr. Babcock, and under the immediate charge of myself, samples of milk have been kept in this way in a warm room for more than a month without being coagulated, and determinations of fat in these samples, at frequent intervals, have shown no change in the amount of fat found. In all, 114 composite tests were made by this method. Each of these was made up of either four or six samples of milk, ranging from partly skimmed milk, containing

little fat to very rich milk containing more than 6 per cent. of fat.

The samples were kept in a warm room from eight to ten days after the first portion was added, and were, without exception, in good condition when the final test was made. All determinations of fat, both in the single and composite samples were in duplicate, the bottles containing the tests were inspected by myself and a written report given to me each day of the test. The final results are given below:

Average per cent. of fat in all single samples, 3.676.

Average per cent. of fat in all composite samples, 3.654.

Of the 114 trials there were only four in which the difference between the composite test and the average of the single tests exceeded two-tenths per cent., and in all of these the milk was partly churned by too much mixing, making it impossible to obtain a representative sample of the composite. Of the remaining 110 trials, only ten gave differences larger than one-tenth per cent. fat, and in forty trials the composite test agreed exactly with the average per cent. of fat in the single tests. These results are far better than we have obtained by any other method, and I heartily recommend its adoption in factories, as *The composite test.*

N. B.—A series of composite tests just completed by the Dairy students of the term of '94 have given even better results than the previous winter, as they were instructed to handle the samples carefully to prevent a partial churning.

**26. How to get the Samples.** In making tests on this plan a pint or quart fruit jar should be provided for each patron. Into each of the jars should be placed, at the start, from one-fourth to one-half gram of powdered potassium bichromate. This need not be weighed as the amount can vary considerable without affecting the results. The amount specified is about one-half as much as would lie upon a cent or as much as can be taken upon a pen knife blade one inch long.

This will be sufficient to preserve from a pint to a quart a week. Enough should be used to tint the whole sample when complete a light straw color, and it should be perfectly liquid when the final test is made. If it does not keep perfectly liquid, more bichromate should be used.

Each jar should have upon it the name or number of the patron to whom it belongs.

**27. To measure and keep the Sample.** A small tin cylinder holding from one to two ounces of milk when filled to the brim makes a convenient measure for this purpose. Whenever a fresh sample of milk is placed in the jar it should be mixed with the milk previously added by giving the jar a rotary motion. The jars should be tightly closed after each sample of milk is added and kept in a cool place during the week. If kept too warm the cream will become so hard that it cannot be mixed in without danger of churning which will always lead to low results.

The test of the composite sample is made in exactly the same way as with fresh milk.

**28. Sampling Milk in Factories.** There are several good methods to follow:

First.—By stirring the milk with a long handled dipper after it has been poured into the weigh can, and dipping out a small portion from which the test sample is measured.

Second.—By punching a small hole in the bottom of the conductor pipe through which a small portion of the milk continually escapes and is caught in a small vessel placed to receive it.

Third.—By laying a small tube in the bottom of the conductor pipe having it project a foot or more beyond the end and placing a small vessel to receive the portion of milk which runs through the tube.

Fourth.—By using a small tube about three-eighths of an inch in diameter with a slide so arranged at the bottom that it will close by slipping up over the tube and close up, when the operator presses down the tube. This tube should be at least as long as the weigh can is deep. As quick as the milk is poured into the weigh can, the operator inserts the tube and presses slightly, to close the valve at the bottom, and the tube contains a column of milk from top to bottom. He then lifts out the tube and inserts the upper end of it in the composite jar and pours in the milk. This is the ideal way of getting a correct composite sample.

This tube was first brought to notice by M. A. Scovell of the Kentucky Exp. Station.

**29. Quick Sampling When Busy.** Suppose you have fifty patrons numbered from one to fifty. First.

—In your refrigerator you have fifty jars numbered from one to fifty; one belonging to each patron.

Second.—A rack containing fifty nine-inch test tubes is placed near the weigh can, also numbered from one to fifty. The tubes in the rack being so arranged that by commencing at one end they may be filled continuously, (no skipping about). Into each tube place a very small amount of powdered potassium bichromate, hardly the size of a wheat kernel.

Third.—Your milk sheet must contain the name and number of each patron.

Fourth.—Prepare a tablet having fifty printed numbers for each day in the week.

When the first patron comes (say number forty), take an ounce measure full of his milk and pour it into the first tube in the rack.

Observe his number when you set down the weight of his milk, and quickly put down his number opposite the printed No. 1 in your tablet. When emptying the samples, at your leisure, into the jars in the refrigerator, we observe that in this case tube No. one would be emptied into jar No. forty, and so on with each patron. Say your next patron is No. twenty-six which goes into tube No. two. Tube No. two will then be emptied into jar No. twenty-six. Very quick work can be done as there is no skipping about or hunting for samples.

**30. Another Good Composite Test.** A very satisfactory composite test may be made in the following manner:

Take a double size bottle (skim milk bottle) for each

patron and measure into this with a 5 c.c. pipette a sample of his milk each day for seven days. The bottle will then contain double the usual test sample, and by adding double the usual amount of acid, the test may be completed as with fresh milk. It is well to shake up the contents of the bottle before adding the acid. But it should be remembered that when a double test sample is used each division on the neck of the test bottle is then only one-tenth per cent. while with a single test sample it reads two-tenths per cent. A composite test for three days can be obtained in the same way with a common bottle by using a pipette containing 5.9 c.c., making the test in just the same way as with fresh milk.

## HOW TO DETECT WATERED MILK.

**31. A Simple Formula.** After milk has stood from two to three hours the lactometer reading may be and generally is from one to two degrees higher than it was on the same milk immediately after it is drawn from the cow, hence it is quite impossible to get a strictly accurate formula.

But the writer's aim is to give a simple formula only approximately accurate, but nevertheless a very valuable guide which may be quickly applied by any intelligent person in a few minutes' time.

**32. Directions for Using the Quevenne Lactometer.** For convenience in the following explanation we assume that L. R. means Lactometer Reading. T. means Temperature.